Regional perspective report

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EuroBroadMap

VISIONS OF EUROPE IN THE WORLD

Synthesis

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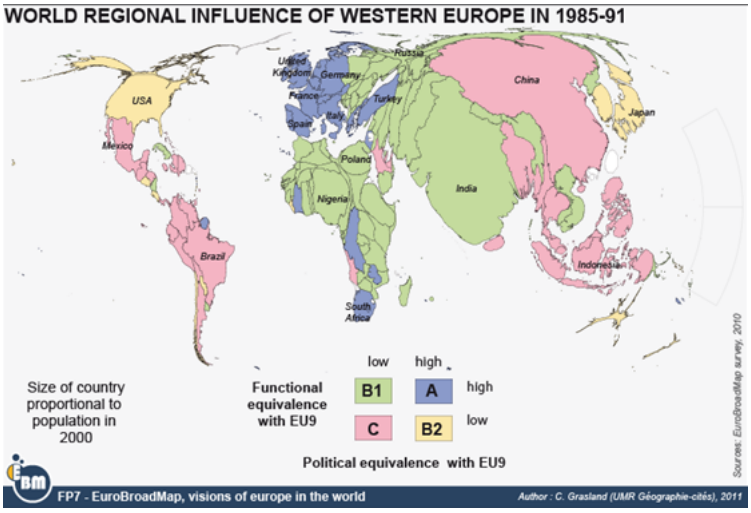

Regional perspective report

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Socio-economic Sciences and Humanities

SEVENTH FRAMEWORK PROGRAMME

This paper benefited from the inputs of Laurent BEAUGUITTE, Yann RICHARD (CNRS, France), Gilles VAN HAMME and Geoffrey PION (ULB-IGEAT, Belgium).

Abstract

Which divisions of the world can be drawn based on subjective, objective and normative visions? Do these divisions fit together? Is the EU always involved in the same region of the world? If yes, which neighbouring places belong to the same region as the EU?

Keywords: World, regionalisation, European Union

Résumé

Ce *working paper* issu du projet EuroBroadMap cherche à répondre aux questions suivantes : quelles divisions du monde peut-on produire en se basant sur des visions subjectives, normatives et fonctionnelles ? Ces partitions se recoupent-elles ? L'Union européenne apparait-elle toujours dans le même ensemble?

Mots clés : Monde, régionalisation, Union européenne

Introduction

We aim to focus this deliverable on the spatial dimension of world divisions and to elaborate a synthesis of similarities and differences between world maps drawn from the mental, functional and political surveys carried out in the framework of the EuroBroadMap project. We will then try to answer the following questions:

- Which divisions of the world can be drawn based on subjective, objective and normative visions?
- Are these divisions consistent with each other?
- Is the EU always included in the same region of the world?
- If yes, what are the neighbouring places that belong to the same region as the EU?

The concept of 'region' is ambiguous because there are several types of definition of the concept of regions. Either a region is a mental spatial representation (Frémont, 1976; Gould and White, 1997) or it is a social construction based on (i) the growing exchanges and interactions between contiguous territories (functional region) (Balassa, 1961; Baldwin, 1997), (ii) the combination of certain of economic, social, political and natural characters (homogeneous region) whatever its size, or (iii) the attraction of a central place (polarised region. Thanks to this ambiguity, the concept of region is convenient because it can be applied at different scales, from the local to the global. As such, regions cannot be taken for granted. They are not given once for all. Regionalisation is by definition an ongoing multifaceted process. It cannot be addressed without considering the time dimension. The limits of these regions are fuzzy and unstable over time. Consequently, in this report the study of world regionalisation spans a period of almost 30 years divided into three sub-periods.

The first sub-period starts in the 1980s, precisely at the moment when the global economy shifts from internationalisation and multinationalisation to globalisation (Michalet, 2004). In addition, this moment is marked by the end of the Cold War, which symbolises the end of antagonistic blocks. It is also the moment when the closed regionalism (i.e., the construction of multinational blocks closed by common tariff barriers) that emerged after the Second World War is progressively replaced by an open regionalism. This paves the way to a process of regional integration, namely the fusion of national economies in large integrated ensembles (macroregions) with common norms, common economic spaces and common policies (Gemdev, 1999). Open regionalism aims at better integrating national economies into globalisation and it is viewed by some analysts as an efficient transitional step for national economies before they can be fully embedded in globalisation,

as characterised by full and highly challenging multilateralism (Newfarmer, 2005, Mashayeki and Ito, 2005).

The second sub-period (1995-1999) is marked by several economic and political dynamics: the acceleration of the transition of former communist countries to liberalism, the rapidly increasing number of regional agreements notified to the WTO and the extension of the scope of regional agreements from economic - first and foremost trade - to political issues.

The third sub-period (2005-2009) is marked by the emergence of a polycentric world from an economic point of view with the relative economic decline of the US and EU and the arrival of rapidly emerging economies on the global stage. The multinational and international patterns of the world economy are not replaced by globalisation, but move alongside it, especially because of rapidly growing financial flows. This process is combined with a political one: emerging countries are more and more claiming a new distribution of power at the global scale and a more balanced relation with old powers. In this context, it is relevant to take into consideration their representations of the world.

In the first section, we propose taking into account three types of regionalisation in the contemporary period (2005-2009) using a comparative approach between the mental representation, functional regionalisation and political regionalisation of the world with a special view on several topics such as trade flows, traffic of air passengers, mental divisions of the world, diplomatic networks and the geographical distribution of votes at the UN General Assembly (UNGA). The second section proposes a focus on mental maps at a world scale based on the analysis of question C of the WP2 questionnaire on representations of the world. It explores the fuzzy dimension of mental maps. In the last section, the selected topics are combined in a historical approach of the regionalisation of the world from the perspective of relations with the European core.

1 Comparative approach of global regionalisation (2005-2009)

The objective of this part is to apply a comparative approach of global regionalisation between the mental, functional and political divisions of the world. The methodology chosen allows us to make a comparison between the divisions of the world, even if the data matrixes are different. The principle is to apply a systematic method of partitioning according to the correlation of residual flows or linkages.

Mental divisions are represented by the number of co-memberships of countries to the same regions of the world, produced by students surveyed in 18 countries.

Functional divisions, which represents the growing exchanges and inter-

actions, are evaluated with two matrixes: bilateral trade flows in 2006 and air flows between countries in 2008.

Political divisions are evaluated by linkages between countries at an embassy level (considering that consulates or other forms of representation are assimilated to a lack of linkage) and the common vote at the UNGA in 2005-2007 (60th and 61st sessions).

1.1 Methodology for comparative subsets

The MaxCor algorithm

In order to obtain comparable results, we have decided to apply the systematic method of partitioning (MaxCor2) elaborated by Claude Grasland (CNRS) and presented in the final report of Work Package 5. The aim of this method is to produce clusters of countries in a systematic way (two, four, eight groups) according to the correlation of residual flows or linkages. More precisely, the method explores relations between countries that are non-randomly distributed, according to a double constraint model of origins and destinations, but without the addition of external variables from the matrix of flows. Size effects are controlled but distance effects are not, which means that countries that are spatially close have a good probability of clustering together and producing 'regions'. However, it is important to keep in mind that MaxCor2 focuses on equivalence criteria rather than on cohesion criteria. It means that countries that are clustered together are not necessarily characterised by direct bilateral links but rather by common patterns of preferential links and barriers with other countries in the world. We have decided to choose equivalence criteria in order to put together not only regions based on cliques with strong internal links (e.g. the trade flows between countries of Western Europe) but also countries that are not related by direct links but indirect ones with the same destinations (e.g. the countries of northern Africa are equivalent in terms of trade because of sharing a common exchange with Western Europe). To clarify this point, we propose a theoretical example where different possibilities of clustering are possible in order to demonstrate that the MaxCor2 method is able to capture the two types of regions within a single model.

A theoretical example of application on a simulated world

We have built a matrix that is a simulation of the contemporary world with three groups of core countries surrounded by peripheries (A, B, C). Each core is characterised by strong internal exchanges (e.g. a high level of flows between A1, A2 and A3) and exclusive relations with dominated countries that are located in their neighbourhoods. Core countries exchange together but not with peripheries that are only related to one set of core countries (e.g. the main flows of a1, a2 and a3 are mainly directed to A1, A2 and A3).

In order to introduce some complexity, we have also introduced a specific set of countries (D) that are characterised by homogeneous exchanges with all countries in the world. This group can illustrate the situation of countries that are energy or raw material producers such as those in the Persian Gulf.

As can be seen in Figure 1, the MaxCor algorithm firstly evaluates what should be the theoretical flows in a flat world where all countries exchange with all other countries according to their sole capacity of import and export (STEP1). The difference between these observed and theoretical flows reveals the preferences between countries that exchange more than expected (STEP2). The correlation between residual flows reveals similarities between countries characterised by the same structure of preferential relations (STEP3). Finally, we use the standard algorithm CONCOR, which multiplies the correlation matrix by itself until all cells are equal to -1 and +1, which defines a partition into two groups (STEP4). Each subgroup can be further divided into two following the same algorithm in order to obtain four groups (STEP5) and so on.

Validation of the algorithm of partitioning

We now examine if the final partition in eight classes fits with the initial assumptions introduced in our simulated example of the contemporary world (Figure 2).

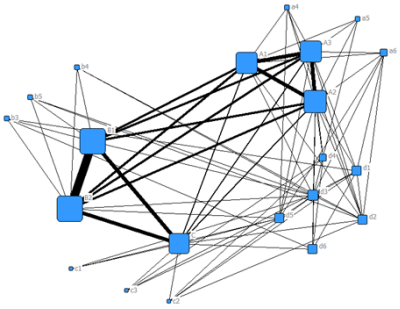
The answer is clearly positive and we can recognise that the procedure has been able, with very few exceptions, to reveal all the expected groups of core countries (A, B, C), peripheries (a, b, c) and energy-producing countries connected to all the world (d). The procedure seems, therefore, to be successful for the objective of the research, namely grouping the world based on flows, taking into account the geopolitical situations of countries in terms of core, peripheries and specific areas connected to the rest of the world because of specific advantages. It is nevertheless important to notice some properties of the algorithm before applying it to real situations.

The different levels of partitioning (in two, four and eight classes) should be analysed together as they reveal different dimensions of the phenomenon. In our example, the partition in two classes firstly revealed a clear division between core countries linked by preferential flows and peripheries characterised by the weakness of their internal exchanges. The partition in four classes revealed the opposition between two opposite cores (A and B+C) but also the specificity of energy producers inside the periphery. It is only at the level of eight classes that differences between peripheral areas are displayed and that division between core B and core C is revealed.

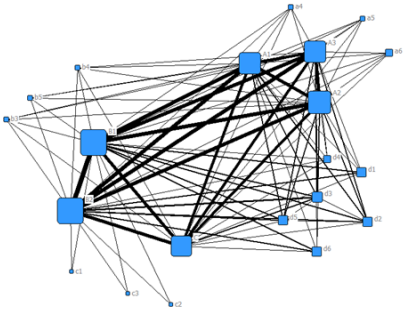
The binary division in two, four and eight classes introduces artificial divisions in clusters when the reality fits better to other clusters. In our example, the separation of country A1 from cluster A or country d6 from cluster d is certainly an artefact and the better partition to be found from

Figure 1: Application of the MaxCor algorithm on a theoretical example

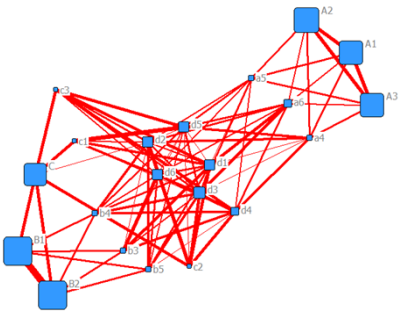
Step O: Observed flows (F_{ij})



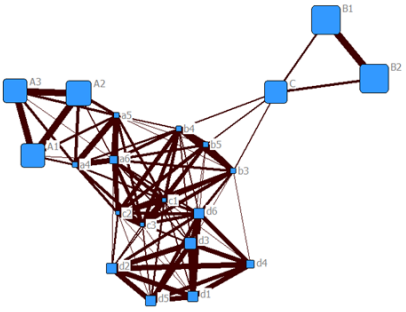
Step 1: Estimated flows ($F * ij$)



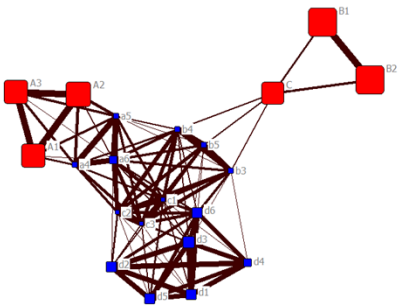
Step 2: Residual flows ($F_{ij} - F * ij$)



Step 3: Correlation of residual flows (R_{ij})



Step 4: Partition in two groups



Step 5: Partition in four groups

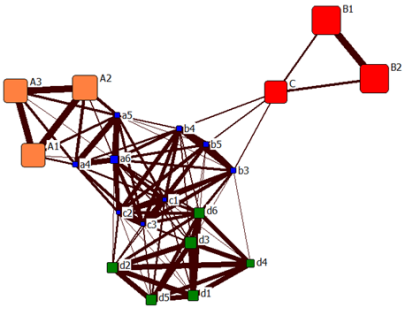
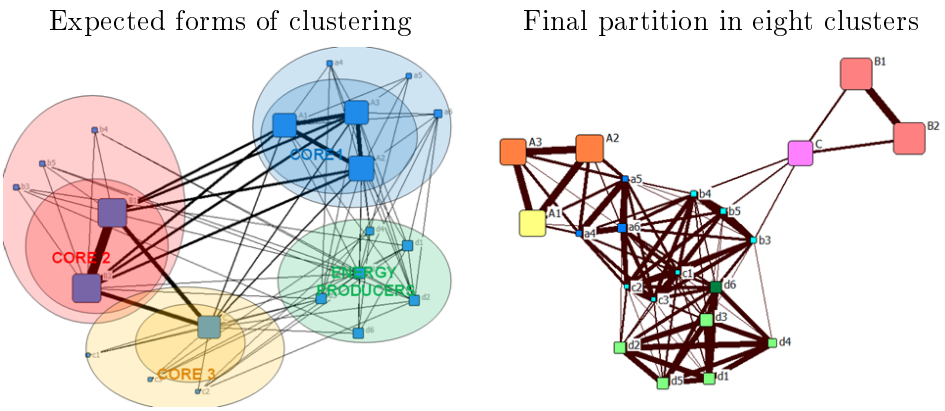


Figure 2: Evaluation of results obtained against the initial assumption



an empirical point of view is probably a division into six classes.

Indirect dependences between countries are revealed by the algorithm CONCOR that are not directly visible on the correlation matrix. The elevation of the correlation matrix to successive power values stress connections between countries that are linked by relatively long paths of indirect links. This property is important because large-scale organisations show increasing levels of local heterogeneity and global interdependency, which means that the channel of the propagation of innovations or economic crisis cannot be measured without an algorithm able to simulate complex patterns of diffusion (Serrano, Boguñá and Vespignani, 2007).

1.2 Mental divisions of the world in 2009

Data on mental divisions of the world

For this part, data are available for 2009, when the EuroBroadMap survey took place. We use the divisions of the world in regions produced by students of 18 countries that has been transferred into a GIS application by Nicolas Lambert. For each country of the world, we have chosen a characteristic point, which is the location of the capital. Then, we have computed for each polygon (region) drawn by a student the number of capitals that are located inside and we derive from the matrix [PC] polygon*countries the number of the co-memberships of countries to the same regions of the world. In mathematical terms, the result is the Country*Country matrix [CC] which is the cross-product of the matrix [PC] and its transposition. To be sure, a figure of '2500' for France and Greece means that 2500 students have put these countries in the same region of the world.

Of course, this matrix of the co-memberships of countries to the same world regions is a very simple and rough approximation of the mental maps drawn by students. Many improvements are possible, for example by choosing several control points in each country (not only the capital) or by introducing more sophisticated weighting patterns (by comparing the results for students of different countries and different places of the survey).

The general pattern of the structural equivalence of mental representation is a 'continental' world vision, because five sets of countries characterised by common preferences are easy to identify on the matrix of the correlation of residual co-membership values (Figure 3). For the students, African countries are, for example, clearly connected together, which is obviously related to 'cultural identity', but also to the clear 'geographical' shape of this part of the world. Africa is represented clearly as an 'entity'. Other examples concern Europe, Asia, Pacifica and Central and South America, which are connected in the mental representations of students. This continental vision can be explained by the influence of school programs (see WP4) and international organisations (Olympic Games), which contribute to formalise mental minds. The limits of the integrated network are not always clear and we can observe interesting positions for two countries, Canada and the US, which are not core in the minds of students. These countries are shared between two major mental structures, namely America on one hand and the North on the other hand, when students decided to divide the world in two parts: North and South.

1.3 Functional divisions of the world in 2007-2008

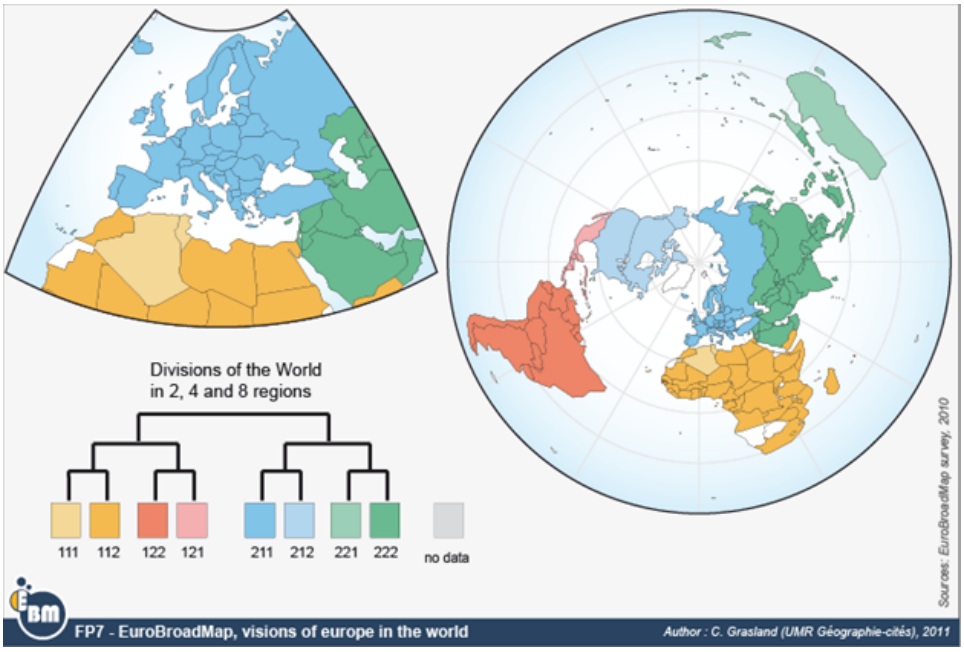
Data for functional divisions of the world

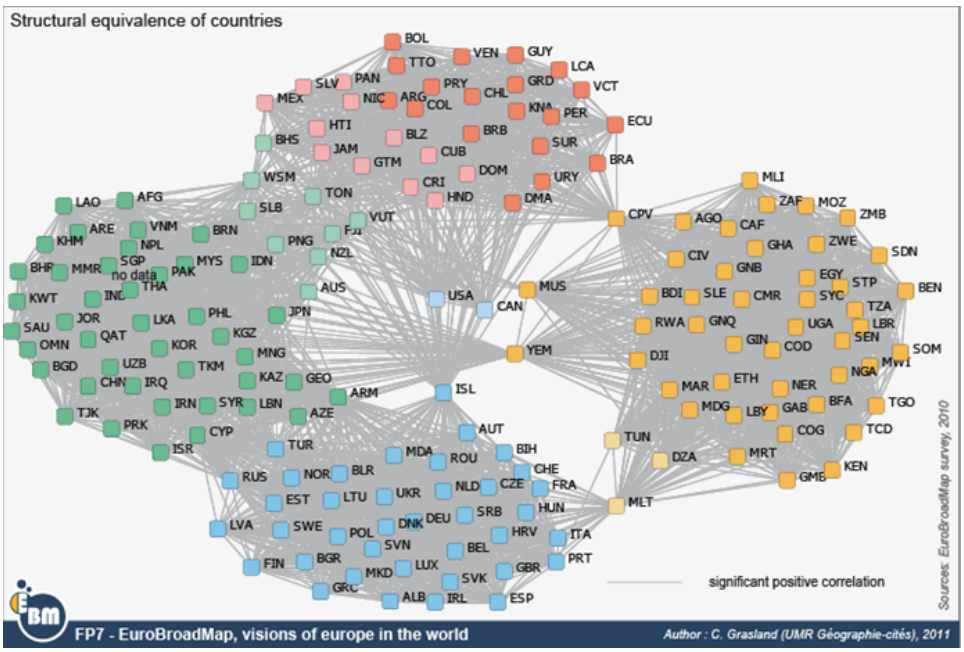
After the examination of the previous set of data used by EuroBroadMap project in WP5, we have decided to focus on the matrix of bilateral trade flows in 2006. This first matrix of functional relation has been completed by a matrix of air flows between countries in 2008 elaborated by IGEAT (F. Dobruszkes) on the base of OAG data but not used until now in the project. The air flows are measured initially as a number of planes between airports for January 2008. These reflect only the supply made by airlines and not on the demand because we have no information on the aircraft occupation, and the origins and final destinations of travellers are unknown. The initial matrix from airport to airport has been aggregated here at a country level.

Divisions of the world by trade flows in 2007

The general pattern of the structural equivalence of bilateral trade flows is complex and does not reveal obvious clusters of countries, even if some sets of countries characterised by common preferences and barriers are easy to identify on the matrix of the correlation of residual flows (Figure 4). EU member

Figure 3: Division of the world according to mental representation in 2009





States are, for example, clearly connected together. This is obviously related to preferential trade agreement, the importance of historical links including at the level of firms and the low cost of transportation induced by short distances. However, the limits of this integrated network are not clear and we can observe two branches of connections directed on the one hand toward the East (former Soviet Union and Turkey) and toward the South (Maghreb and Western Africa). Switzerland, Norway and Western Balkan countries are clearly associated to the EU cluster in terms of trade, but some member states seem to be relatively weakly correlated, in particular Baltic countries and Finland, which are strongly related to Russia in relative terms, but also Ireland, which is characterised by preferential relations with the US.

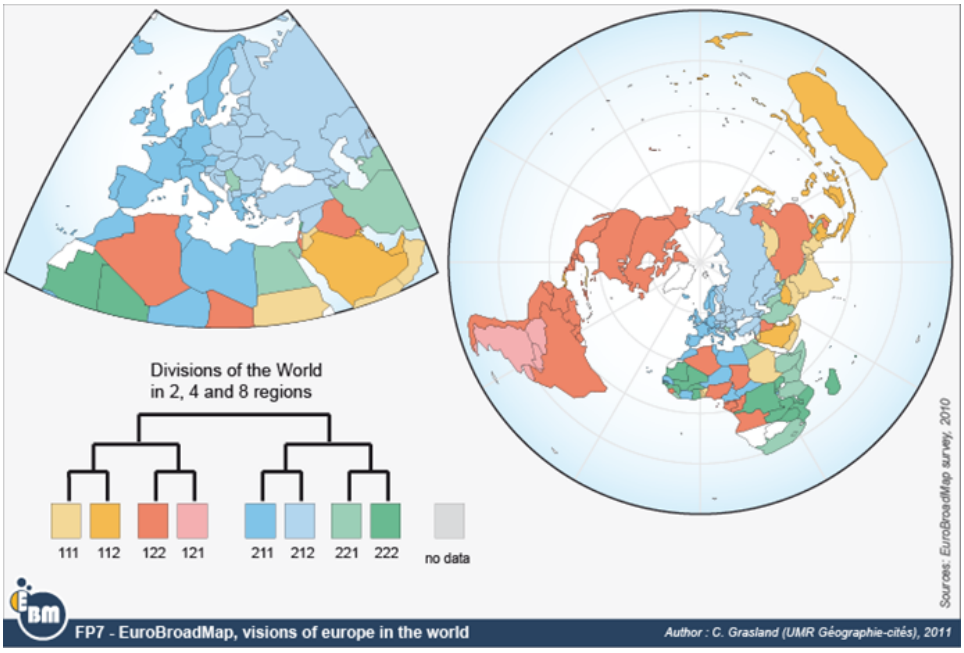
The partition of the world obtained using the MaxCor2 algorithm confirms the previous observation and reveals the existence of different levels of trade integration around the core of Western Europe. The partition in two groups is a global opposition between a great Euro-African area (including Russia and Central Asia) and the rest of the world. The partition in four groups introduces a clear separation between the Euro-Mediterranean area and the majority of countries of sub-Saharan Africa that are less integrated with Western Europe and more connected together (South-East Africa) and with the rest of the world (increasing trade flows with China, the US, Brazil and Japan). Finally, the partition in eight groups divides the Euro-Mediterranean area into two separate clusters according to a line that is more or less equivalent to the former Iron Curtain that separated Europe before 1989. The Western part is typically characterised by a strong polarisation of flows toward France, the UK, Spain and Italy and the Eastern part by preferential trade relations with Russia and Germany.

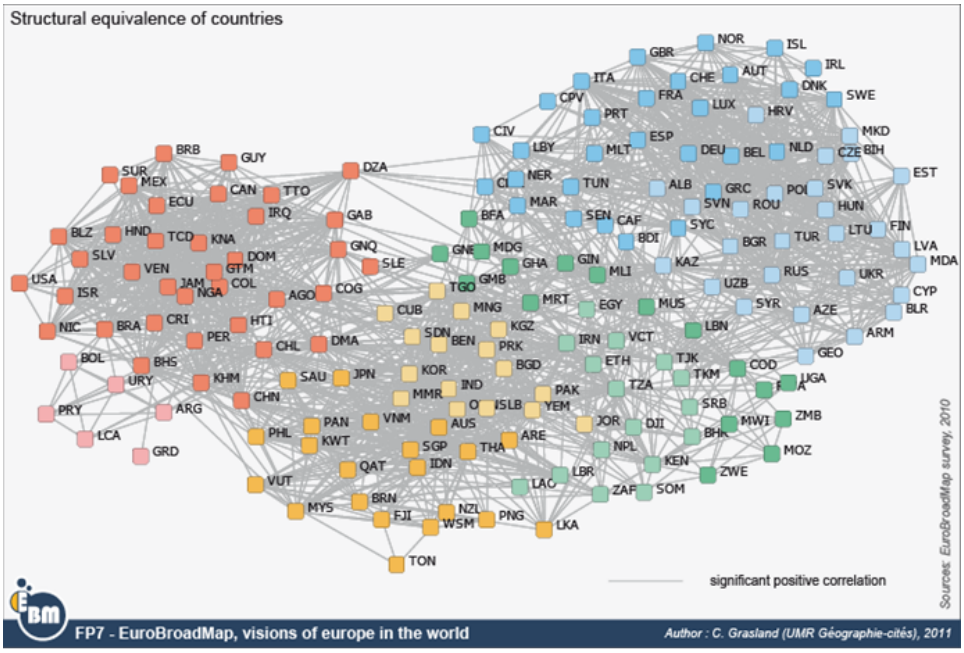
In conclusion, the analysis of trade flows reveals an area of integration that is at the same time larger than the EU, but deeply divided between East and West. The Mediterranean Sea cannot be considered as a discontinuity according to this criterion.

Divisions of the world according to air connections in 2008

The general pattern of the structural equivalence of air connections is fundamentally dual and reveals a strong opposition between what is classically called the New World (Northern and Southern Americas) and the Old World (Africa, Europe and Asia) in the textbooks of history and geography. Inside each of these world regions, we can observe very strong clusters of countries characterised by high levels of correlation of their preferential air connections and less intermediate situations than in the case of trade. The reason for this stronger organisation of air flows is related to the concentration of air flows around major hubs located in a limited number of global airports (Paris, London, Frankfurt, Zürich, Amsterdam, New York, Los Angeles, Singapore, Hong Kong, Tokyo) with a second level of polarisation with more specialised

Figure 4: Division of the world according to bilateral trade flows in 2007





airports at a more regional scale (Moscow, Dubai, Miami, Madrid, Cape Town, Vienna). Many countries are thus strongly dependent on one or two major hubs located in external countries for their global relations with the rest of the world, which explains why they seem to be strongly correlated. Moreover, the major hubs are also organised into clusters that fit with the classical organisation of the world in a Triad (Northern America, Western Europe, Eastern Asia) but also with the pattern of new emerging poles (the Persian Gulf, Southern America, Southern Africa, Oceania).

The partition of the world obtained from air flow analysis (Figure 5) is similar to the one revealed from trade analysis. Indeed, the division of the world into two clusters reveals one more time a Euro-Mediterranean area enlarged to include the former Soviet Union but exclude Persian Gulf countries and the majority of Sub-Saharan Africa. The partition in four clusters reveals the opposition between two major areas of air connections in America and the Euro-Mediterranean, but also an emerging area including Southern and Eastern Asia, Oceania and the Persian Gulf. Japan is an interesting exception as it is involved in the American cluster and separated from the rest of Asia[1]. The partition in eight groups reveals the particular case of Sub-Saharan Africa, which is more and more an area of shared influence of the three major poles of the world economy. Inside the Euro-Mediterranean area, we observe one more time a clear division between a Western part (polarised by the airports of London, Paris, Amsterdam and Zürich) and an Eastern part more connected to the airports of Germany, Austria, Russia and Scandinavian countries. Both areas are divided clearly into centres and peripheries.

In conclusion, the analysis of air flows reveals, as in the case of trade flows, an area of integration which is at the same time larger than the EU and deeply divided between East and West. The difference is that the Southern bank of the Mediterranean Sea remains strongly related to Europe but not to Sub-Saharan Africa.

1.4 Diplomatic division of the world

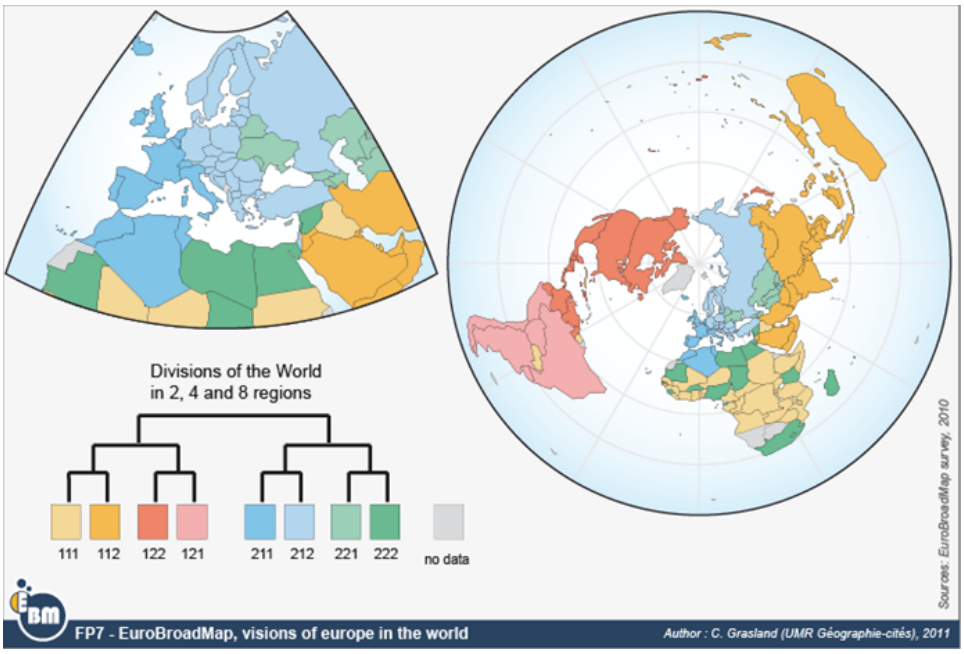
Data on the diplomatic divisions of the world

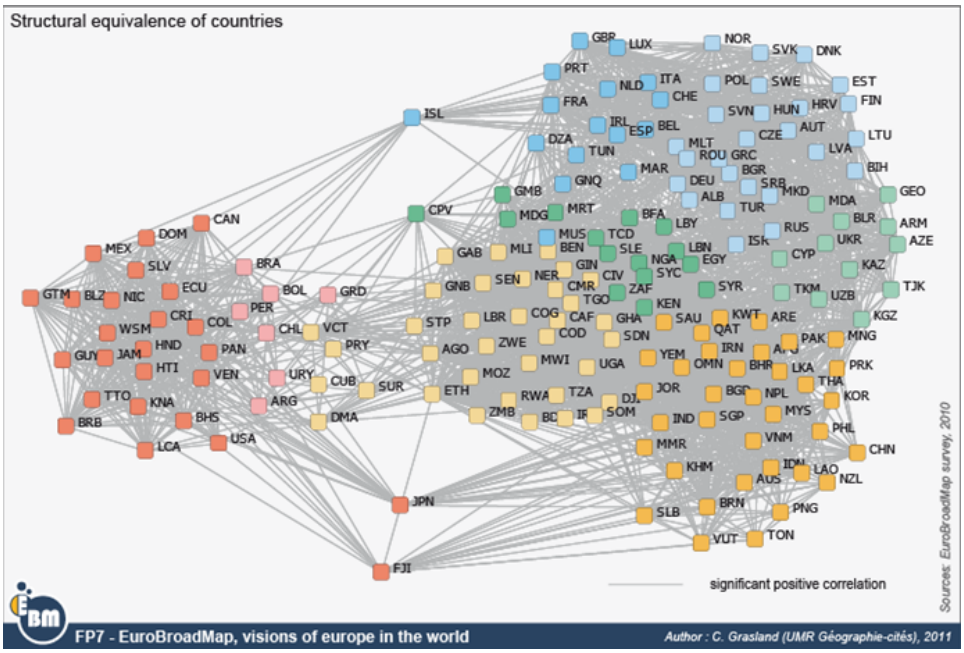
Concerning diplomatic networks, we have decided to use the network of embassies provided by the Correlates of War Diplomatic Exchange database [2]. We have used a simplified version of the diplomatic relation and we

[1] The explanation is related to the fact that most Asian countries are characterised by preferential air connections with Japan, which is obviously not possible for Japan itself as internal air flows are not taken into account. The preferential air relations of Japan are therefore with the US, which justifies its correlation with other Northern American countries such as Canada or Mexico.

[2] The Correlates of War Diplomatic Exchange data set captures diplomatic representation at the level of chargé d'affaires, minister, and ambassador between members of the

Figure 5: Division of the world according to air flows in 2008





consider only the linkages between countries at an embassy level (considering therefore that consulates or other forms of representation are assimilated to a lack of linkages). In order to complete the diplomatic networks, we have used another criterion, namely the number of common votes at the UNGA in 2005-2006 (60th and 61st sessions). This database was created by Laurent Beauguitte, manager and researcher of the EuroBroadMap Project.

Divisions of the world according to the embassies network in 2005

The general pattern of the structural equivalence of the embassies network defines a ring of strongly connected countries on the general basis of geographical proximity. The graph of correlation is indeed very close to a geographical map of the world seen from the North Pole and this situation can be easily explained by the necessity for all countries to develop firstly diplomatic relations with their immediate neighbours. War and conflicts can, of course, introduce temporary exceptions, but in general the countries with limited resources will develop firstly diplomatic relations with the major world players (G20 countries) and with the countries located at short distances away and those sharing a common terrestrial or maritime border. In terms of correlation, the development of relations with major countries such as the US, France, the UK, Russia, Brazil or China is not specific and the connections with neighbourhoods are those that contribute the most to the definition of preferential relations and correlations presented in Figure 5.1. Specificities are sometimes inherited from history such as diplomatic links between the former countries of the socialist bloc or colonial links of African countries with France and the UK. Current geopolitical position can also produce differences, with the typical examples of the presence or lack of embassies in countries such as Iran, Israel, Kosovo or North Korea[3].

The partition of the world obtained with the MaxCor2 algorithm for the embassies network (Figure 6) is clearly different from the one that had been revealed by the functional criteria of trade and air flows. Indeed, the first division in two groups seems to be an opposition between old and rich industrial countries and poor and emerging countries. In this division of the world, the historical links developed between Europe and America on both sides of the Atlantic Ocean are clearly visible, as well as connections established with industrialised countries such as Australia, New Zealand, Japan or South Korea. Further divisions in four and eight clusters introduce regional differentiations based on geographical proximity but connections at

Correlates of War interstate system. Reference: Bayer Resat. 2006. 'Diplomatic Exchange Data set, v2006.1.' Online: http://correlatesofwar.org.

[3]It is important to observe that the countries with the most important diplomatic networks (France, the US, the UK, China, Japan, Germany, Canada, India) are less correlated with the other countries of the world because they have precisely no real regional specificities but are also not precisely similar each other. Their allocation to a particular group is therefore not very relevant.

long distance remain visible, for example in the case of Spain/Latin America countries because of their strong historical links. An interesting division can be observed in Africa between a Northwestern part, which is still strongly connected to Europe, in particular through French networks, and a Southeastern part that was historically more related to the UK but which has more connections with East Asia.

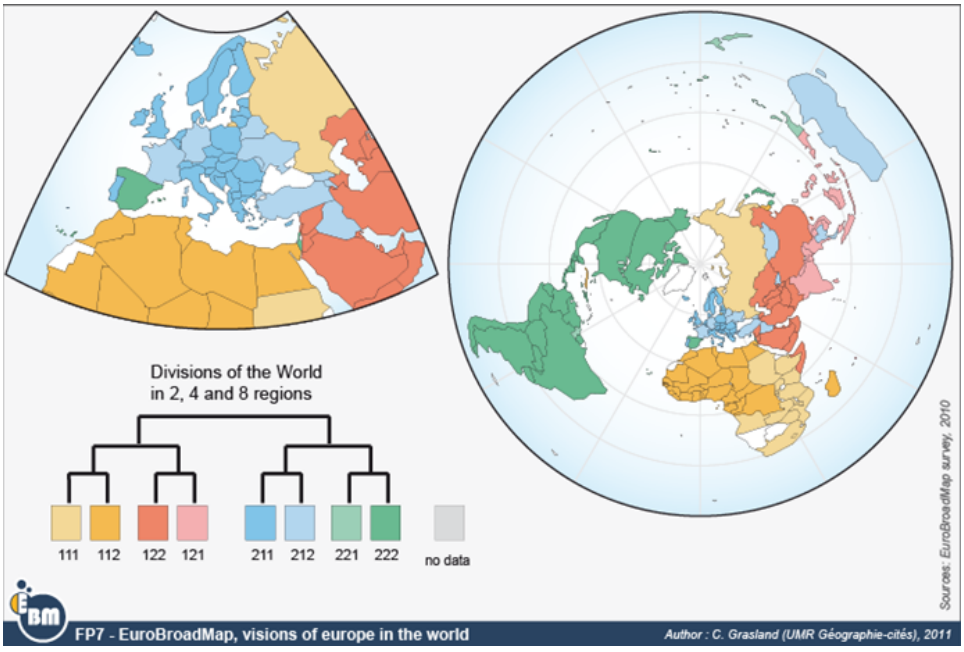
In conclusion, the analysis of the embassies network reveals an important level of association between rich EU countries, America and most developed countries of the Western Pacific area. The Mediterranean Sea seems this time to be a significant discontinuity even if part of Africa remains linked to the EU.

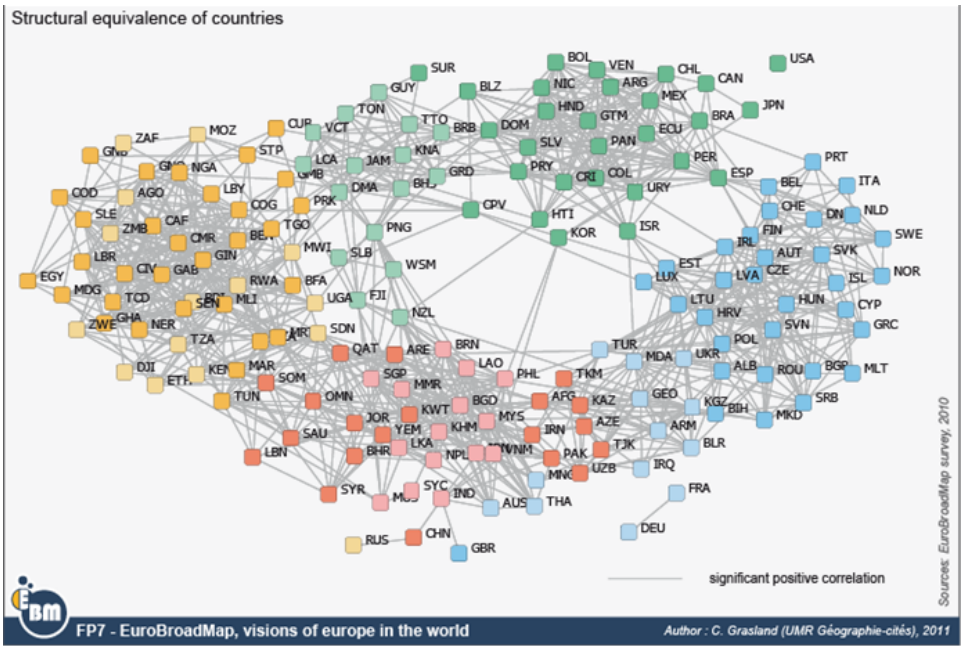
1.5 Divisions of the world according to the vote of resolution at the UNGA in 2005-2007

The general pattern of the structural equivalence of votes at the UNGA defines an almost perfect division of between Western countries and the rest of the World. Even if this first result is well known by researchers in political science (Holloway and Tomlinson, 1995; Voeten, 2000), it deserves a more in-depth analysis of the border countries (located on the limits of the two main blocks) and the internal differentiations of each block (that cannot be immediately perceived on the initial figure). Concerning the border countries, the cases of Russia and Argentina are particularly interesting because they reveal indirect connections between the EU respectively with the former Soviet Union and Latin America. Both countries are characterised by an ambiguous perception of their relation with the EU associated with strong historical linkages. This linkage is related to past migrations in the case of Argentina (see the Analysis of the perception of the EU in Argentina in the WP3 report) and to geopolitical alliance and conflicts with Western European states from the 16th to the 20th centuries in the case of Russia and the former USSR. From this point of view, it is interesting to observe that Turkey, which presents the same historical ambiguity in its relation with Western Europe, is clearly involved in the Western group of countries and is therefore characterised until now by a clear assimilation to this block in terms of the vote of resolution at the UNGA. The same is true for Baltic countries, Ukraine, Georgia and Armenia, but not for other former republics of the Soviet Union that define a transition group mostly located on the non-Western side. This probably highlights the importance of NATO as a military organisation that spatially extends beyond the EU toward Turkey and some former USSR countries. Azerbaijan and Belarus are, for example, located in this transition group with countries of Central Asia such as Kazakhstan and Uzbekistan.

The partition of the world obtained using the MaxCor2 algorithm for the UNGA vote (Figure 7) reveals firstly the trivial and expected opposition

Figure 6: Division of the world according to the embassies network in 2005





between Western countries and the rest of the world but it helps also point out the original situation of some border countries that cannot be fully assimilated to one block. As well as the cases of Argentina and Russia, we can observe specific situations for countries of Central and Eastern Africa that present an original pattern of vote at the UNGA. This originality is sometimes related to partial alliances with former European colonisers, as in the case of Côte d'Ivoire, Gabon and the Central African Republic, obviously subject to an influence of French diplomatic and economic networks. But it can also be related to a genuine originality as in the case of Cameroon or Democratic Republic of Congo. It is finally worth noting that the correlation method has revealed the proximity of the US and Israel to the Western group, despite the fact that these countries are characterised by a strong isolation on the majority of resolutions[4].

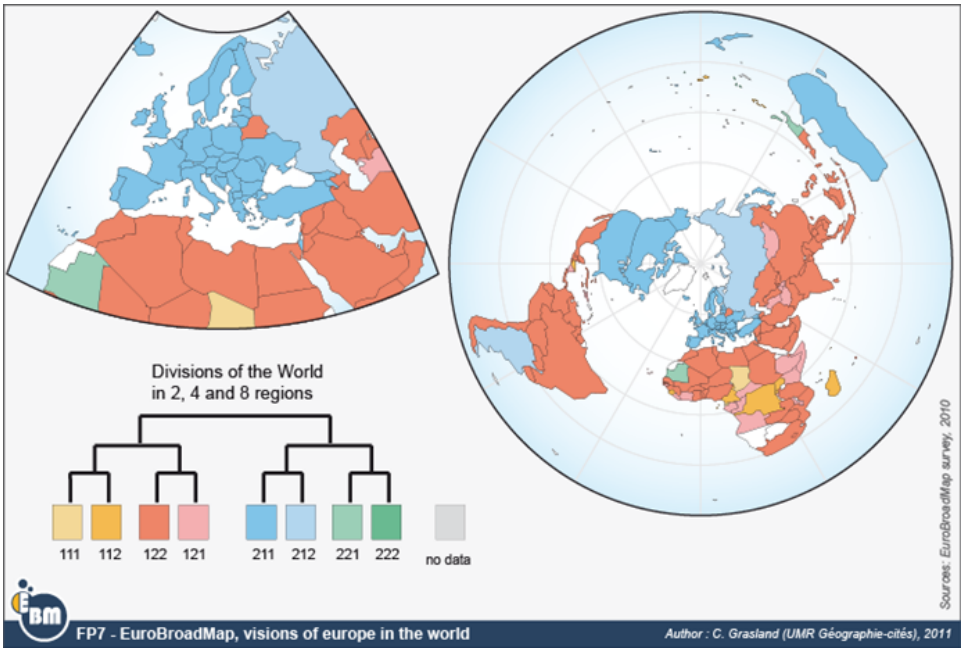
In conclusion, the analysis of common votes at the UNGA reveals a strong dichotomy between Western countries and the rest of the world. From this point of view, Europe is clearly member of a club of rich countries, symbolised by memberships to organisation such as the OECD or NATO among others.

1.6 Synthesis: correlation between the divisions of the world

The analysis of each of the previous criteria revealed some similarities but also differences between the world regions. A European region emerged in all analyses but its shape was not always the same. It can include Russia (mental divisions) or not (embassies network). It can include North American and Australia (vote at the UNGA) or some northern African countries (air flows). Moreover, the division between Western and Eastern Europe can appear or not, and when it appears the countries included in each area can vary: the air flows world division draws a quite small Western Europe, whereas the vote at the UNGA includes all Eastern European countries excluding Belarus and Russia. Of course, the nature of the flows are different and some of them are real (trade, air flows) and others virtual or symbolic (vote at the UNGA). A quantitative appreciation of the resemblance between the divisions of the world can be obtained through a measure of the correlation between each criterion (Figure 8). The strongest correlation obtained can be observed between the two functional criteria (trade and air flows), which are both real flows whose spatial organisations can be influenced by similar factors such as distance. One of the lowest correlations can be observed between the embassies network and voting behaviour at the UNGA. If both criteria were chosen to reflect diplomatic flows, their natures would be quite different. Embassies reflect bilateral relations and this can be influenced by historical links, whereas votes at the UNGA reflect countries' positions on the main issues of the world scene. As far as mental divisions are concerned, they

[4] Correlation is indeed not based on the mean value of common vote but on the similarity of patterns with other countries.

Figure 7: Division of the world according to common votes at the UNGA in 2005-2007



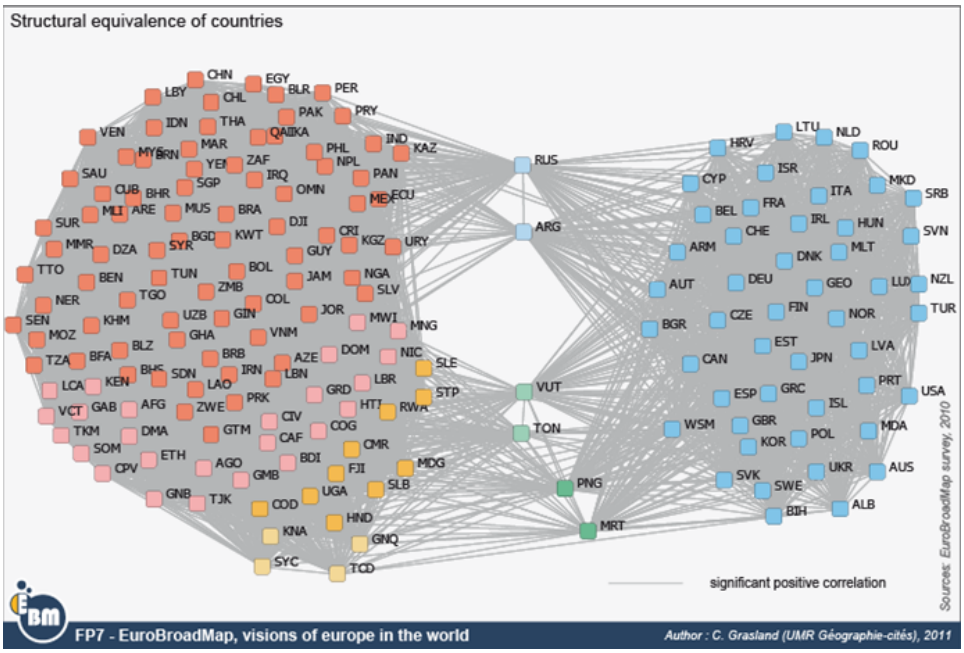
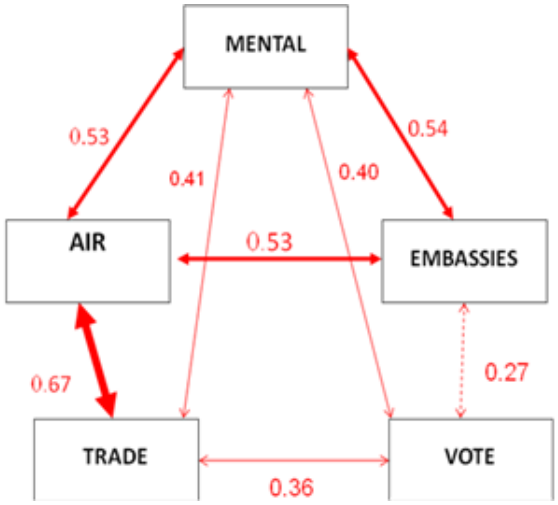


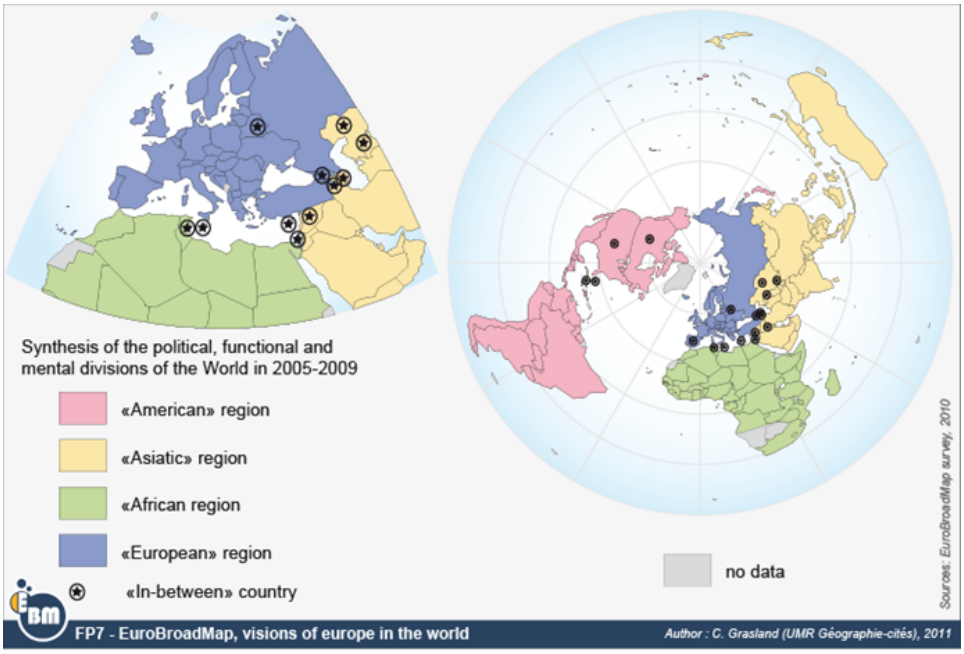
Figure 8: Correlation between mental, functional and diplomatic divisions of the world in 2005-2009

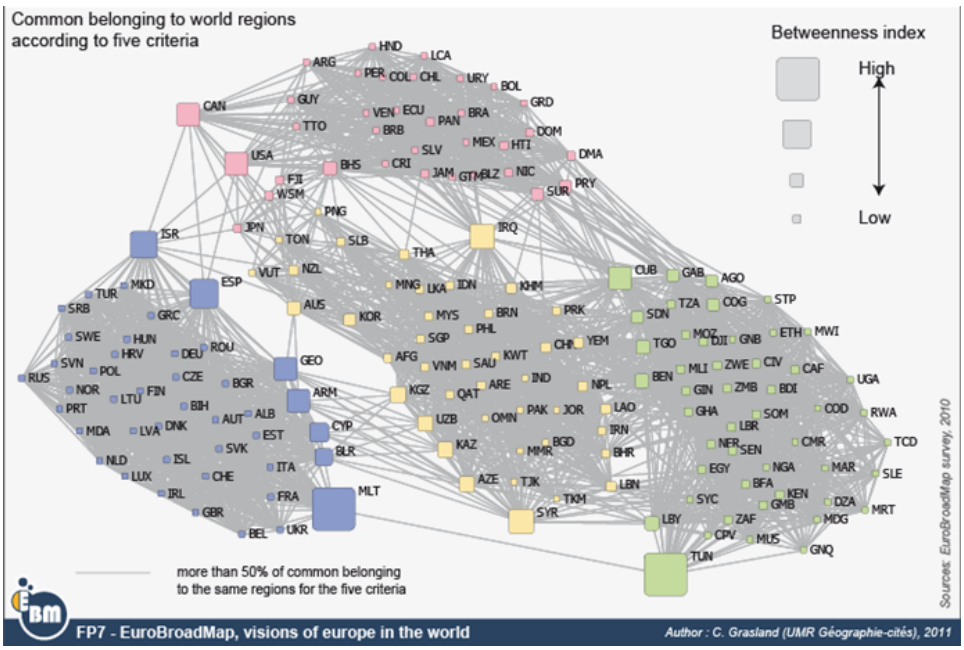


seemed to be clearly correlated with air flows and the embassies network but less with world divisions based on trade and votes at the UNGA. Indeed, the mental division follows continental patterns, which can also be observed to a certain extent with the embassies network and air flows.

The pattern obtained through the combination all previous criteria (Figure 9) shows a global division of the world into four obvious regions ('American', 'European', 'Asian' and 'African'), thus stressing the influence of the continental organisation of flows and continental representation of the world. But, what is more interesting is to focus on the 'in between' countries that cannot be easily related to one single region, because their connections are different from one criterion to another one. Most of those 'in between' countries are located along the southern border of the 'European' region such as Tunisia, Malta, Cyprus, Georgia and Kazakhstan. Other cases are more political than geographical, such as the US and Canada, which are typically in an 'in between' situation characterised by strong functional links with the rest of the 'American' region but important diplomatic links with the majority of the countries in the 'European' region. These in between countries are characterised by specific positions in functional, political and diplomatic flows but also by some hesitations in drawing world regions as far as the mental divisions of the world are concerned. This implies that we should explore more in detail this specific position, at least in one criterion, the mental division of the world.

Figure 9: Synthesis of world division in 2005-2009 according to mental, functional and diplomatic criteria.





2 Borders in mental regionalisation

In this part, we choose to focus on the mental regionalisation of the world more precisely on the question of the existence of a European region. In case this European region emerges in the mental world region pattern, we examine its shape and its position in the world. We first analyse how the countries are grouped into world regions. We focus then on the core areas of the regions drawn by the students and the areas that overlap. From this perspective, we pay special attention to the European core and its fuzzy borders. In the last part, we focus on the European border in order to explore the complexity of the mental reorientation of European borders.

These analyses are mainly conducted with data obtained from the survey on the mental maps of students, particularly part C of the questionnaire on world maps, where students were invited to draw up their own world regionalisation (15 regions maximum). The information has been reduced to the country level thanks to a co-belonging matrix: for each country, we counted the number of times it was placed in the same region as all other world countries.

2.1 Hierarchical process of the mental divisions of the world

Focusing on mental regionalisation, we have chosen to analyse how countries were grouped thanks to a hierarchical classification applied on the world regions co-belonging matrix (Didelon, 2005). Seven steps of classes are represented here (Figure 10), even if the most significant are the divisions in the fifth and seventh classes. This helps decompose visually the building of world regions, allowing us to observe the world division at each step. The main objective is to understand how countries are grouped together and to determine the main regions drawn by the students. In the last step, these seven classes are drawn and we give them the names of the central object, in order to avoid misinterpreting the world regions.

In the first step of the classification, the division of the world into two regions shows the early isolation of a 'Gabon region' from the rest of the world. As said before, Africa has, to students' eyes, a coherent geographical shape that helps define it without hesitation as a world region. Moreover, other parts of the world are sometimes grouped into regions that do not include African countries: developed countries, Eurasia etc.

The second step shows the isolation of a 'Denmark region' that includes Russia but neither Island nor Greenland, and that corresponds quite well to some classical definitions of Europe (from Brest to Vladivostok). The following steps show the divisions of the rest of the 'old Eurasian' part of the world in three regions ('Iraq', 'Northern Marianna' and 'Bangladesh') and the splitting of the 'new world' into two pieces ('St Vincent and the Grenadines' and 'Bahamas').

To summarise, the division of the world obtained in the last stage shows that students have mainly a continental vision of the world, as the main objects formed can be named with the classical names of the continents. One exception is the 'Iraq' region, which is not an historical continent but rather one of the classical subdivisions of 'Asia'. However, this part of the world emerged clearly in the representation during the XXth century in a rather geopolitical context (Capdepuy, 2008, 2009). Even though some differences exist (Turkey not included in the 'Denmark' region and different patterns of division between the northern and southern part of the Americas), the results are quite similar to those obtained in 2005 from quite different public surveys (geographers and spatial planners involved in the ESPON program) (Didelon, 2005). Indeed the survey, conducted four years later on young students, shows how much the vision of the world is constituted of the stable objects mainly built on the continental division of the world (Grataloup, 2010). However, the mental divisions of the world are blurred or fuzzy and it is worth exploring in more detail the shapes of the regions' limits.

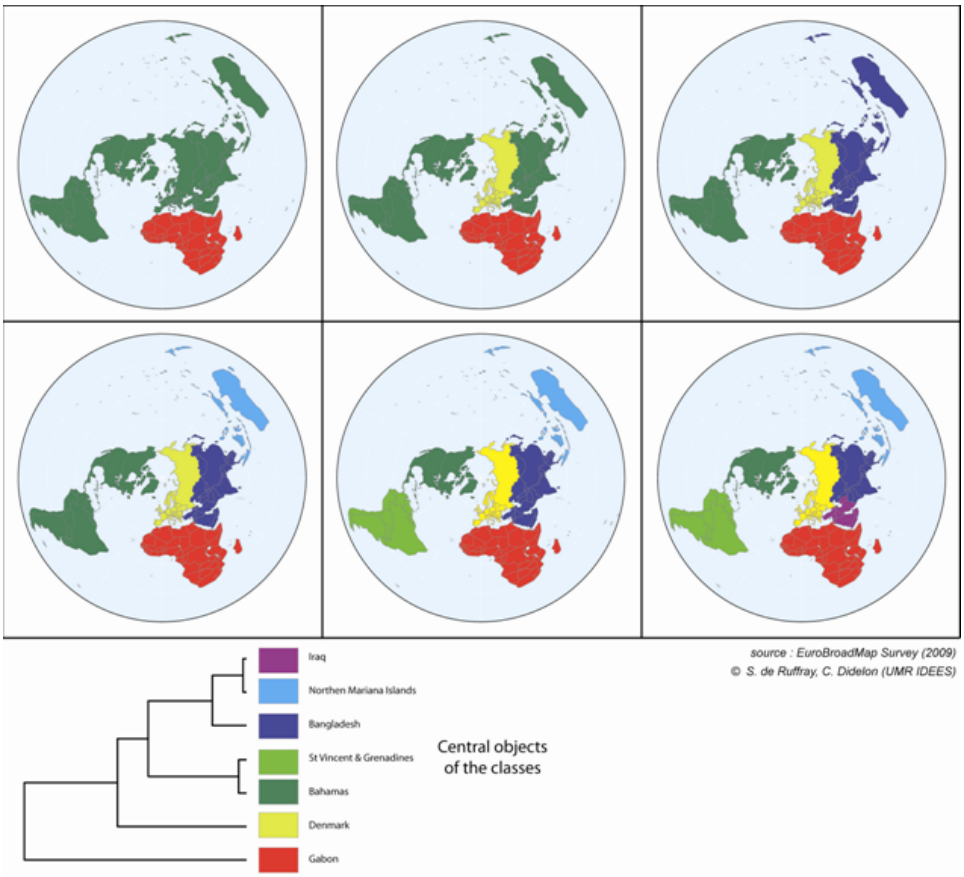
2.2 Extension of fuzzy regions

Based on the previous hierarchical classification of mental regions, we explore the countries grouped together in the same class and check how fuzzy or well defined these different regions are. If the regions formed in the previous classification seem quite well defined, some specific challenges have to be raised as far as mental maps are concerned. If, as stated by Montello (2003), the creation of geographical regions is a necessary approach to effectively organising the knowledge of the world, respondents to the survey are unlikely to have a precise idea of regions' limits. Regions are merely defined in terms of their visual structure, of specific activity, of ethnic composition and of other characteristics that are not strictly related to spatial cognition (Kuipers, 1978) and are built using and mixing various sources of information (Friedman, 2009; Battersby and Montello, 2009). We consider therefore that it is difficult, if not impossible, to define a world region as the sum of the spatial elements belonging to it without ambiguity. Thus, we have to define the region as a 'fuzzy space' (Zadeh, 1965; Rolland-May, 2003). From this perspective, fuzzy set theory is of great help to formalise the subjectivity, uncertainty and imprecision according to human perception (Bouchon-Meunier, 1995) and help deal with poorly defined regions.

In order to catch how many regions obtained from our analysis are fuzzy, we calculate a distance measured based on the 'probability' between each country of the world and the central object of each class (Bouchon-Meunier, 1995). The collection of maps below (Figure 11) shows the probability level of each country of the world belonging to all the classes obtained from the world regionalisation. Some observations have to be made:

- All countries of the world have at least a low probability of belonging to

Figure 10: Hierarchical process of the mental divisions of the world



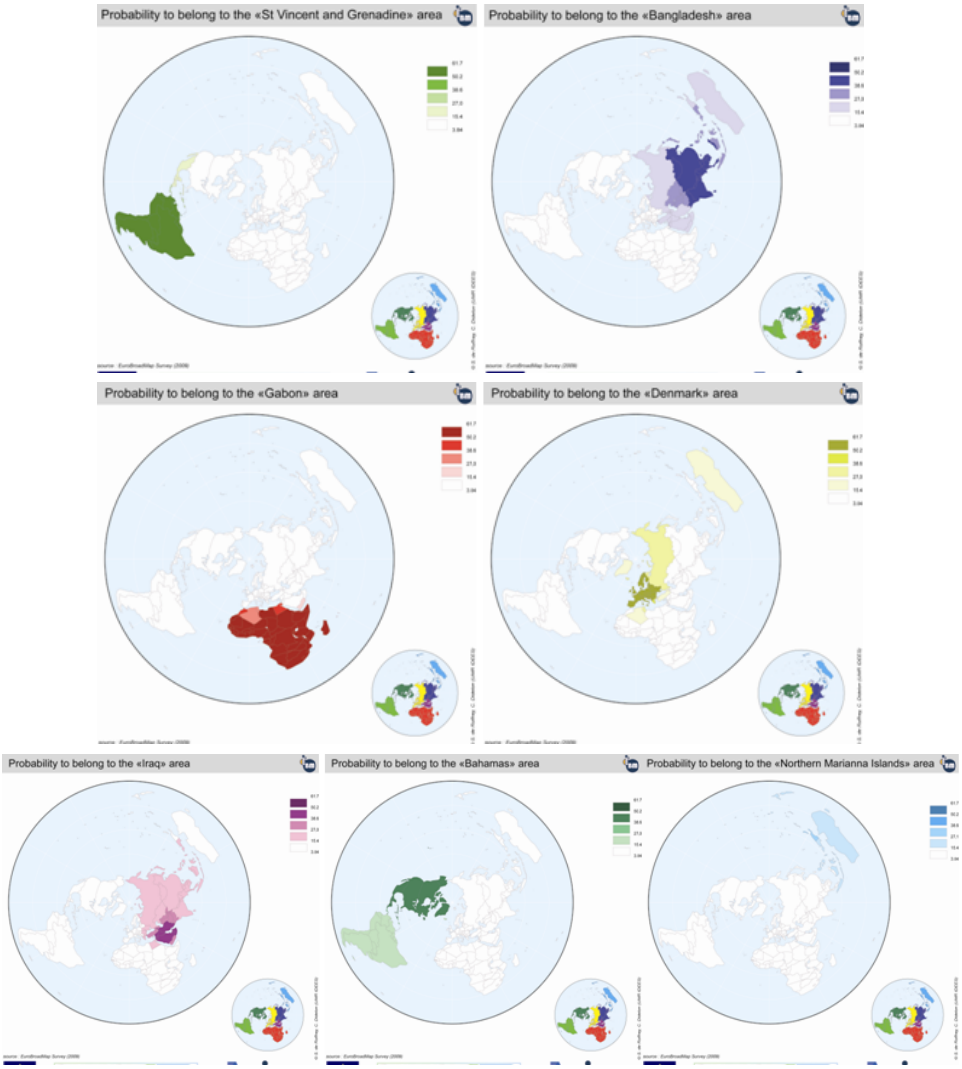
each region: the minimum probability value for all maps is 3.84 (even though the colour on the map is white for visualisation purposes). For example, the Cook Islands in the South Pacific have a minimum of 12.28 probability of belonging to the 'Gabon area' and a maximum of 17.29 of belonging to the 'Northern Marianna Islands' area.

- The maximum value of the probability of belonging to a region is retained by Gabon, precisely for the 'Gabon area'. This value is not so high and this lets us understand that this country can be included in other world regions. Thus, if Gabon is the central object of the class formed by African countries, it does not mean that African countries are always grouped together or cannot be included in another world region.

Those two observations can be explained by the fact that even the regional figures we obtained are similar to a certain extent to the continental vision of the world; some students did not follow this way of representation. Some made 'north' and 'south' regions, 'rich' and 'poor', 'exploited' and 'exploiter' or even 'one world region'. Therefore, the classification presented before is a summary of the world regions drawn by students but makes us lose some information on the least frequent world mental regionalisation.

The maps of the probabilities allow us to identify some 'core' regions (dark colours), fuzzy border regions and even fuzzy regions where even the highest values are low. In the group of 'core' world regions, we can identity first the 'Gabon area', a group of all African countries in dark red, except for some few northern African countries. This core group is the largest we can observe and matches nearly perfectly with the classic 'African continent'. Other core regions do not cover all the regions formed by the hierarchical classification. For example, in the 'Denmark' area, a core can be observed but it is the smallest of the regions identified previously. Other regions also show cores but it should be stressed here that the maximum probability values for the two first regions are not very high in the 'Iraq', 'Bangladesh', 'St Vincent and Grenadines' and 'Bahamas' regions. Then, a last region seems to be fuzzy in itself - the 'South Marianna Island' region, where the highest value to belonging to this zone is not high. Anyway, nearly all world regions show fuzzy borders, with decreasing values of probability of belonging. Those regions are more or less large and more or less complex in their configurations. For example, the 'Denmark' area shows a relatively large extension of high and medium probabilities of belonging to this area. Russia and Greenland have significant probabilities of belonging to the 'Denmark' area, but so too do Turkey, some countries of the southern Mediterranean shore (Tunisia, Algeria) and also, more surprisingly, Australia, which should have been included with European countries in 'north' or 'west' or 'rich' regions by the students.

Figure 11: Fuzzy analysis of the mental division of the world in seven regions

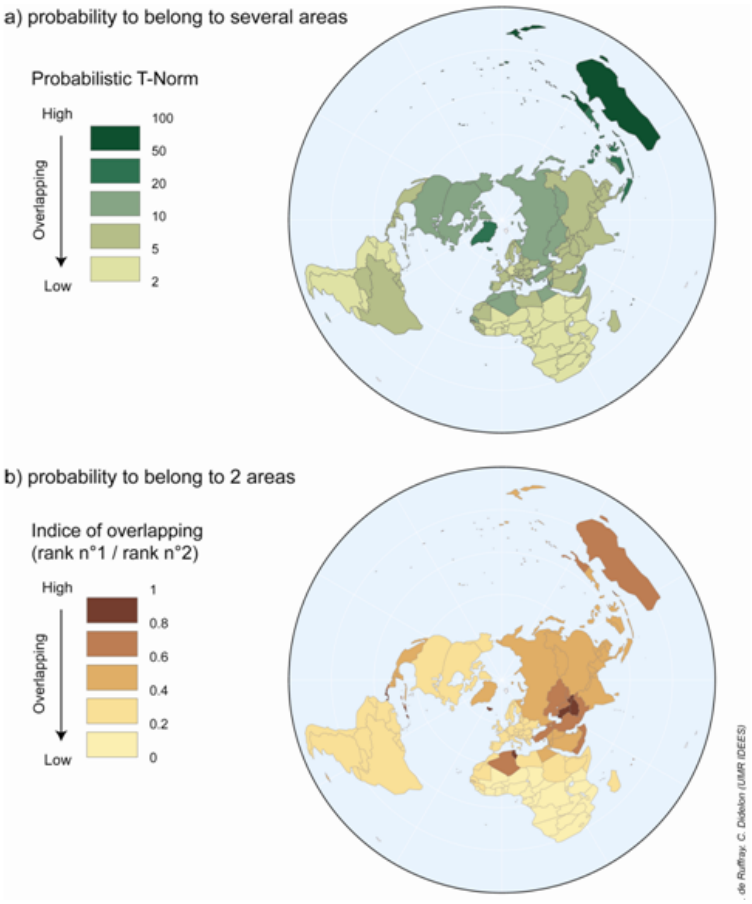


2.3 Overlapping areas in the world

The overlapping regions can be analysed more in detail by calculating specific indicators. The probabilistic T-Norm, presented below (Figure 12), is quite useful to stress the regions that are largely shared between all other world regions (Zadeh, 1965, Didelon *et al.*, 2011). On the following map, the darker green regions are those most shared between all world regions drawn by students. Pacific countries are in this situation, along with Greenland. The areas of overlapping appear quite well in this map. They cover large parts of the Eurasian continent shared between Europe, Asia, the Middle East and Central Asia as well as the northern African countries shared between Africa and Europe. North American countries seem to be a significant interstice area that could be explained by the fact that the US and Canada often belong to the 'north', 'developed' or 'exploiter' regions together with Japan and European countries. All these observations are coherent with the interstice areas identified in previous research (Didelon *et al.*, 2011) except in the case of North America. The places we have identified as core regions are in light green such as the sub-Saharan African countries, part of South America and three European countries: Germany, the Netherlands and Denmark.

A second indicator used here can be considered to be an 'index of overlapping' (Figure 12) between two regions. It provides an indication of how much a country has a probability of belonging to two regions with close probabilistic values. For example, the value of overlapping for Australia is high because it could belong to the 'South Marianna Island area' (25.68) and to the 'Denmark area' (16). On the contrary, the Democratic Republic of Congo value is low because the maximum value (61.5 for the 'Gabon area' is much more important than is the second rank value (10.1 for the 'Iraq area'). The map obtained allows us to stress the countries shared between two world regions. This is the case for the 'Iraq region' countries, which appear as a dark brown colour, as well as Tunisia and Algeria. Three countries of the Iraq region (Afghanistan, Turkmenistan and Tajikistan) seem mainly shared between the 'Iraq region' and the 'Bangladesh region'. Tunisia and, to a lesser extent, Algeria are shared between the 'Denmark' and 'Gabon' regions. The small countries of Central America and the Caribbean (Panama, Dominican Republic and Puerto Rico) are shared between the 'Bahamas' and 'St Vincent and the Grenadine Islands' regions. European countries show relatively low values of indices of overlapping but a focus on a candidate country to EU membership could be interesting. The index of overlapping of Turkey is relatively high and this country is shared mainly between the 'Denmark' and 'Iraq' regions.

Figure 12: Overlaps and margins in the mental division of the world in seven regions



3 An historical perspective of the regionalisation of the world from the perspective of relations with the European Core

In order to take into account a historical perspective of the regionalisation of the world, we have decided to select data on functional flows and political linkages that make possible a comparison between all countries of the world in three periods (see introduction). However, the number of countries available in the different matrices of flows and linkages used in the first part of this report is not the same according to each criteria and (obviously) to each period. In order to obtain comparable results, it was decided to exclude all countries that are not available for the four criteria (trade flows, air flows, embassies, votes at the UNGA) for the last period of 2005-2008. The result is a selection of 171 countries that defines the maximum size (171×171) of the matrix to be used for the research of the divisions of the world. In previous periods, the number of countries is more limited (e.g. Switzerland was not a member of the UN in 1995-1996 and is therefore not included in the matrix of vote at this time). This reduction is especially obvious for the first period where only 140 to 150 countries are generally available. In the case of countries that existed before 1989 but were divided later, we assume a continuity of existence with the mainland part (Yugoslavia/Serbia, USSR/Russia, Czechoslovakia/Czech Republic) but we add the new countries created after the division (Croatia, Ukraine, Slovakia). In the reverse case of fusion countries (Yemen and Germany), we exclude from the analysis the countries that have disappeared because of unification (Democratic Republic of Germany, Democratic Republic of Yemen).

3.1 Methodology for the elaboration of an integrated historical perspective

Each of the four criteria considered in the previous section reveal the existence of world regions that cover more or less the territory of the current EU but with different degrees of extension toward eastern and southern neighbourhoods. The question is now to evaluate how these different geometries fit together and which countries are linked to the EU for both functional and diplomatic criteria and which ones are only associated to the EU on only one of these two dimensions. This question cannot be answered by the simple analysis of the contemporary situation; rather, it needs a dynamic perspective, looking at the combination of criteria in the three different periods of time: in 1985-1986 before the fall of the Iron Curtain and the end of the socialist block; in 1995-1996 when the perspective of the enlargement of the EU from 15 to 27 produced deep changes in the relations with countries located in the eastern and southern peripheries; and in 2005-2008 when the process

of EU enlargement was temporarily achieved and when the growing influence of emerging economies (China, India, Brazil, Southern Africa) and possible renewal of geopolitical Russian influence introduced strong changes in the traditional areas of influence of Western Europe countries, in particular in Africa and the Middle East.

In order to evaluate these transformations, we have decided to adopt a more Eurocentric approach by measuring the similarities for each criterion between the countries of the world and the nine Western European countries that have been EU members since 1973[5]. In concrete terms, we determine the median of the nine coefficients of correlation that can be observed and we consider this median value as a measure of proximity or remoteness to the Western core of the EU for each of the four criteria (trade flows, air flows, embassies network and vote at the UNGA). As these criteria are measured in three different periods of time, we build a table with four columns where each country of the world appears three times (for 1985, 1995 and 2005) except if this country has disappeared or appeared during the period. We finally apply a hierarchical cluster analysis on this table in order to derive typical situations of relations with the Western European core that can be compared over time. The cluster analysis reveals the existence of four typical situations of countries with the EU, which confirms the partial independence of the functional and diplomatic dimensions:

- Type A: Countries positively correlated to the EU9 in both functional and diplomatic terms. Of the members of the EU, a good example of this situation is given by Turkey or Switzerland, which are not currently members of the EU but which presented during the whole period of study (1985-2005) all the signs of a full integration with the EU9 as regards their trade exchanges, air flows, diplomatic networks and voting behaviour at the UNGA[6].

- Type B1: Countries positively correlated to the EU9 for functional relations but negatively for diplomatic criteria. The best example of this situation is given by the countries of Northern Africa (Morocco, Algeria, Tunisia, Libya and Egypt) that are characterised during the whole period by preferential trade or air relations with countries of Western Europe, even if both functional criteria are not always equally fulfilled. These functional linkages are not confirmed by diplomatic linkages because these countries develop specific networks of embassies different from the ones of the EU (e.g. case of Israel) and because

[5] France, Belgium, Luxembourg, the Netherlands, Italy, Germany, Denmark, the United Kingdom and Ireland.

[6] In the case of Switzerland, it is of course not possible to evaluate votes at the UN before its admission to the UN in 2002. Therefore, the level of diplomatic correlation is evaluated only on embassy networks in 1985 and 1995.

their patterns of votes at the UNGA make them clearly members of the 'non-Western' block.

- Type B2: Countries positively correlated to the EU9 for diplomatic criteria but negatively for functional relations. The US, Canada, Australia, New Zealand, South Korea and Japan are the most obvious representatives of this situation during the whole period. Despite their long distances from Western Europe, they are clearly characterised by a common pattern of embassies networks and a common attitude concerning votes at the UNGA. However, they are also engaged in other regional networks when it comes to functional relations measured by air or trade flows and present therefore the opposite characteristics of North African countries.

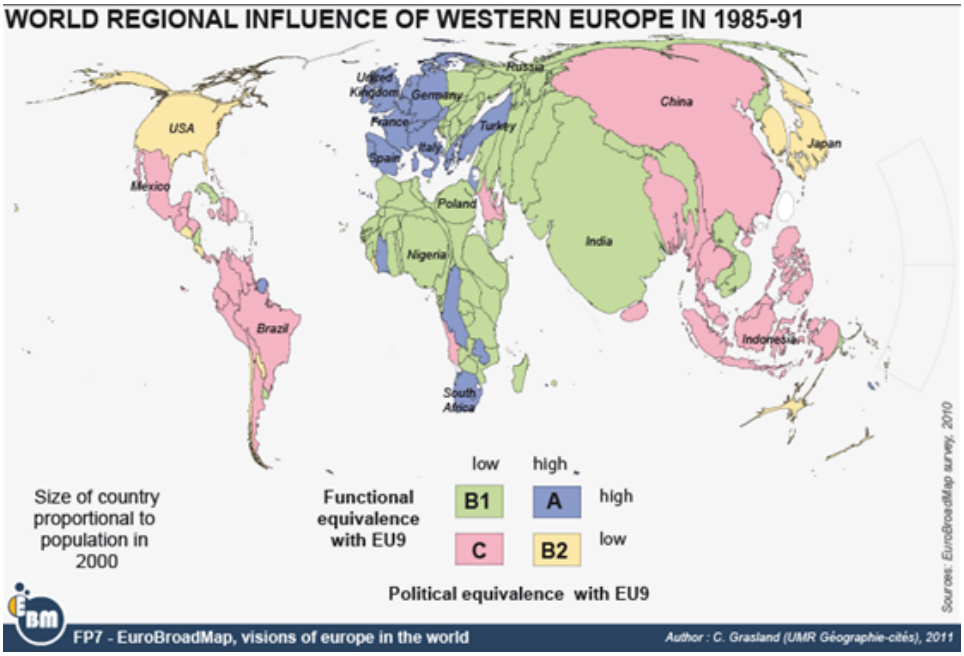
- Type C: Countries negatively correlated with the EU9 in both functional and diplomatic terms. This situation is typically observed in large emerging countries such as China and Brazil but also more generally in remote countries with few connections with Europe such as the Philippines and Indonesia. It can also be observed in countries that have strong historical links with Europe but are currently more polarised toward competing cores of Northern America and Eastern Asia such as Mexico and Saudi Arabia. We are here in the opposite situation of type A, with countries that are integrated in another world functional area for trade and air relations and which do not develop the same patterns of diplomatic relations according to embassies networks and votes at the UNGA.

We can summarise these four typical situations with a 2×2 table crossing the levels of political and functional linkages between the EU9 and the countries of the world. Until now, we have described the stable pattern of the relations between the EU and other parts of the world. We will now use the same method and cartographic representations to observe the historical evolutions of the EU's influence in the world between 1985 and 2005.

3.2 Western European relations in the world at the end of the Cold War (1985-1986)

The core of the European region at the end of the Cold War is clearly determined by the political division between socialist and capitalist countries (Figure 13). The enlargement of the EU to 15 members in 1995 seems to be the logical consequence of the strong functional and diplomatic integration of the countries. The exceptions of Norway and Switzerland are only apparent if we consider that they were candidates and that the proposal to join the EU was not adopted by the citizens of these countries. The case of Turkey is the most interesting because such opposition by its citizens does not exist. By

Figure 13: European world diplomatic and functional linkages in 1985-1991



contrast, it is the opposition of existing EU members that has delayed until now the adhesion of Turkey for various reasons that are officially related to human rights but also and the strong feeling that 'Turkey is not European' despite its obvious association in both functional and diplomatic terms. It is interesting to note that some African countries also present the dual characteristic of strong correlations with the EU in functional and diplomatic terms: Côte d'Ivoire, Malawi, Zaire and South Africa. Although these are not democracies, they are supported by former European colonial powers and areas of high benefit for West European firms. From this core, we notice a wide area of functional integration that covers the major part of Africa, the Middle East and Central and Southern Asia. Despite political opposition, strong commercial links still exist with the countries under Soviet influence and the colonial ties remains important in other parts of Asia and Africa. Diplomatic linkages are also important (as they will remain to be) with the US and other rich OECD countries that are both economic partners and allied against the Soviet Union. There are finally very few countries that can be considered to be poorly linked to the EU at this time: these are found mainly in South America (with some exceptions such as Chile) and South-eastern Asia (with the exception of the Indochina peninsula).

As a whole, Europe has a large influence on the world if we consider

both functional and diplomatic linkages. This influence relates largely to the strong historical links between Western Europe and most of the world. Despite the weakness of Europe as a political actor during the Cold War, it remains a major actor in the world because of the dependence of large regions of the world on the European economy.

3.3 European relations in the world during the period of reunification (1995-1998)

The most important trend of this period was the development of both functional and diplomatic links between Western and Eastern Europe, including Russia and former republics of the Soviet Union (Figure 14). The diplomacy of Western European countries as well as their private firms interests in relocation to low cost countries were very active in this period in both functional and diplomatic integration, as is clearly visible through the extension east of the previous core. In both cases, the perspective of enlargement has been a powerful tool for unification with clear effects of anticipation: private firms were attracted by the future opening of the borders, while Eastern and Central Europe states also reoriented their diplomatic links in order to obtain the ticket of entry into the EU. In the case of the former republics of the Soviet Union, many of them remained strongly linked to Russia by their trade relations but tended at least to develop diplomatic linkages with Western Europe, at a period where Russia also deepened its linkages with the European core. The former Yugoslavia was obviously less concerned by the trends because of the civil war. From this area of strong integration, no major changes are visible at first glance. Some countries previously characterised by functional integration have moved to the group of minimal European influence but it concerns only a few countries (Angola, Gabon, Pakistan). The countries characterised by diplomatic correlation are almost the same if we do not consider changes in Latin America (exchange of position between Chile and Argentina).

As a whole, the situation in Europe in the 1990s was characterised by an extension of the core area east and the relative stability of diplomatic and functional relations with the rest of the world.

3.4 Shrinking European relations in the world in the contemporary period (2005-2008)

Between the mid-1990s and mid-2000s, we observed a major shift concerning the EU's influence in the world. Contrary to the previous period, no major changes were observed in the limits of the core area characterised by strong diplomatic and functional links (Figure 15). This core is now clearly delimited by the Mediterranean Sea to the south and by Turkey and Russia to the east. But these two countries are not necessarily allied to the EU in

Figure 14: European world diplomatic and functional linkages in 1995-1998

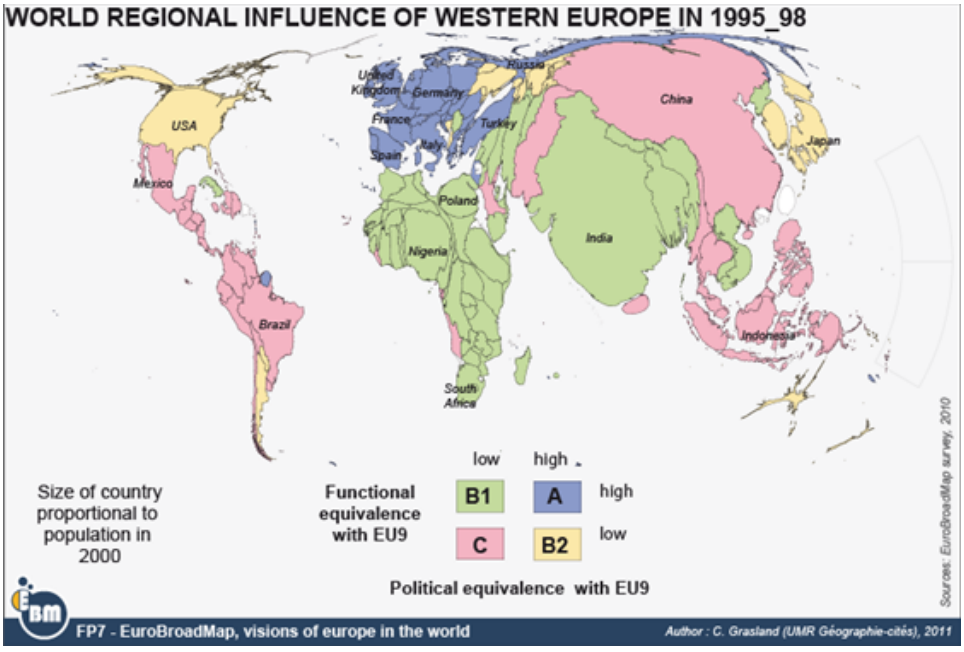
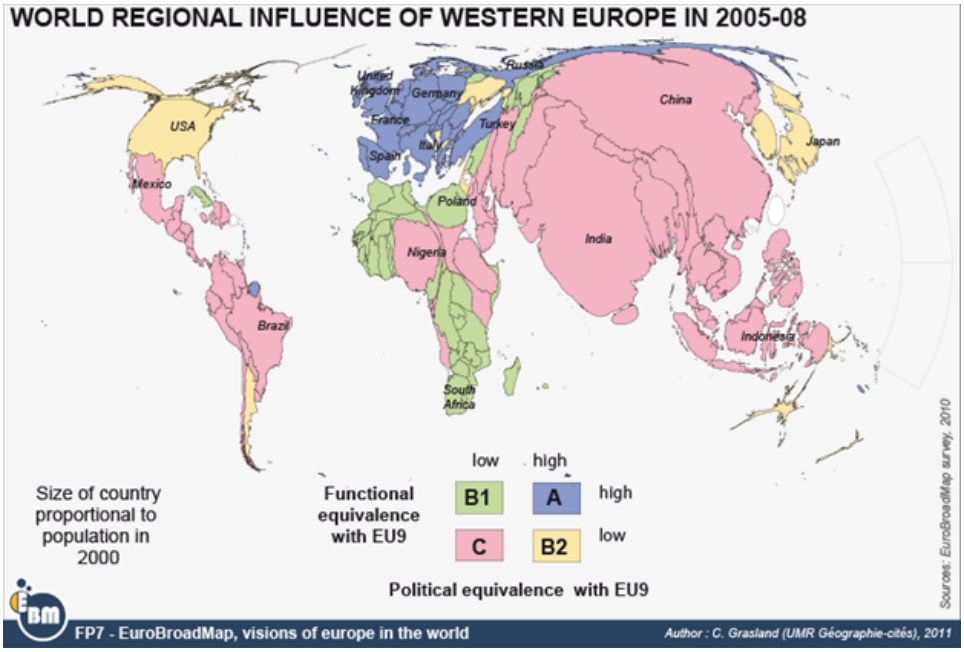


Figure 15: European and world diplomatic and functional linkages in 2005-2008



the future of world competition, even though they are strongly linked to the EU by air and trade flows and by common diplomatic patterns. Russia has gained new influence with the increase in energy prices and it is interested in building new links toward China and Japan in order to reduce its commercial dependence on the EU. Turkey is more and more tired of the delay of its adhesion to the EU and is starting to develop a new geopolitical concept of autonomous core countries, taking benefit of its strategic position. Moreover, these two countries try to balance their relations. The map clearly demonstrates the erosion of the EU's influence in Africa, the Middle East and Southern Asia where major countries are now classified in the group of countries poorly linked to the EU in both functional and diplomatic terms (Nigeria, India, Vietnam, Iran). Even though diplomatic relations are apparently more stable, this erosion of the EU's influence seems to be a major issue that is certainly related to many factors such as the closure of external borders south and the fear of external immigration in ageing societies.

As a whole, the situation in Europe in the 2000s was characterised by a stabilisation of the core area but a clear decline of its world influence in functional terms, especially in Africa, the Middle East and Southern Asia.

Conclusion

The present analysis of the dynamics of these functional and diplomatic relations has revealed some interesting discrepancies between the objective dimension of realities and political dynamic of the enlargement of the EU. The most striking case is clearly the one of Turkey, which since 1985 has presented all the signs of an EU member when we consider trade flows, air flows, embassies network and votes at the UNGA but has not been admitted to the EU and is always obliged to provide supplementary proof of its 'European-ness'. Even if we cannot neglect the objective reason related to the *acquis communautaire*[7], it is clear that the explanation of this delay has to be found in other dimensions of reality that are not related to objective facts but to the more subjective perception of 'what is' or 'what should be' Europe. Even when the adhesion of the EU is not directly at stake, a clear asymmetry can be noted in the perception of southern and eastern neighbourhoods of the EU, as was well illustrated by the debate between EU member states when France proposed to launch an 'Union for the Mediterranean'. On one hand, Germany refused the first project where only countries located on the Mediterranean coast were invited to participate, considering with reason that Northern European countries are also strongly involved in Northern Africa because of economic or tourist flows. On the other hand, the new member states of Eastern Europe claimed that a focus on the Southern neighbourhood should not be a priority and that the EU should focus on the Eastern dimension toward countries such as the Ukraine. The foreign minister of Poland declared, for example, that "In Poland we distinguish between the EU's southern and eastern neighbours: in the south we have neighbours of Europe, in the east we have European neighbours of the EU that - if they fulfil the criteria - will one day be able to apply for membership'. This distinction between so-called 'European neighbours' and 'neighbours of Europe' is clearly a key component of the perception of the world by European policymakers, and also probably by citizens. If we do not take this into account, we cannot understand what is probably the key explanation of the recent decline in European influence: the fear of the stranger and the feeling that Africa is or should be separated from Europe by a clear border, whatever the price in economic or diplomatic terms.

The mental maps of the undergraduate students that we have collected in the EuroBroadMap survey provide an exceptional opportunity to evaluate the importance of mental barriers, especially question C where students were invited to divide a map of the world into regions. Looking at the borders drawn by the students, we can evaluate the proportion of students that use the Mediterranean Sea as a dividing line between Europe and Africa and the

[7] The *acquis communautaire* covers a list of requirements in terms of governance, economic rules, human rights and so on that are necessary conditions to become an EU member state.

proportion of students that include Turkey or Russia in the same region as the rest of the EU. Furthermore, how many students propose maps without any divisions and claim the existence of 'one world'?

Undergraduate students do not necessarily share the same opinions as their elders do about the limits of Europe. Even though they have been strongly influenced by the same textbooks in which the world is divided into continents, they have had more opportunities to travel abroad (at the same ages) and receive more information about the external world by new channels of communication such as the Internet. The EuroBroadMap survey also offers the opportunity to benchmark the perception of world regions elaborated inside and outside the EU. The Mediterranean Sea is not necessarily perceived as a limit with the same frequency in the eyes of French and Tunisian students. And what are the opinions of Chinese, Brazilian, Indian or Cameroonian students on the limits of Europe? Do they include Russia and Turkey or do they limit their 'Europe' to the restricted set of rich countries of Northwestern Europe?

It is not possible to analyse all these dimensions in the current report. However, it is at least worth proposing some basic elements based on these preliminary results in order to examine if mental maps fit with the functional and diplomatic divisions of the world that have been previously discussed or if they introduce cognitive dissonance between objective and subjective realities.

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